

## **REMARKS**

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

### **Disposition of Claims**

Claims 1-40 are pending in this application. Claims 1, 11, 21, and 31 are independent. The remaining claims depend, directly or indirectly, from claims 1, 11, 21, and 31. Claims 1, 9-11, 19-21, 29-31, 39, and 40 have been amended to clarify the present invention recited. As support for these amendments is found in the specification, no new matter has been added.

### **Rejection(s) under 35 U.S.C § 102**

#### **U.S. PATENT NO. 6,423,802**

Claims 1-40 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,423,802 ("Miller"). Claims 1, 9-11, 19-21, 29-31, 39, and 40 have been amended in this reply. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

Independent claims 1 and 11 have been amended to recite that a weight-to-volume ratio of a salt included in a well fluid is within a range of greater than 260% to about 400%. Similarly, independent claims 21 and 31 have been amended to recite that a weight-to-volume ratio of a salt included in a well fluid is within a range of at least 260% to about 400%.

The Examiner asserts that, in Example 2 and col. 4, lines 31-33, Miller discloses

well service fluids having salts, *i.e.*, cesium formate and potassium formate, within the claimed range of weight-to-volume ratio. However, as is clear from col. 2, lines 31-33 of Miller, Miller only teaches that a cesium brine has at best a density of 2.3 grams-per-cubic centimeter ( $\text{g/cm}^3$ ). Further, as is described with respect to Example 2 (see col. 6, lines 49-53), Miller discloses that a salt mixture having potassium formate and cesium formate (1.88 specific gravity) is mixed in a ratio of a 1:1.27 solution buffered to a pH of 10.0 and includes a copolymer added in the amount of 6 pounds per barrel (lb/bbl). Consequently, when salt weight-to-volume ratios are calculated for the cesium brine and the mixture of potassium formate and cesium formate, one can see that a maximum salt concentration disclosed by Miller is 216.5%. Because this concentration is less than the minimum weight-to-volume ratio of 260% recited in amended claims 1, 11, 21, and 31, Miller fails to disclose the invention as claimed.

In view of the above, Miller fails to show or suggest the present invention as recited in independent claims 1, 11, 21, and 31. Thus, these claims as amended are patentable over Miller. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

U.S. PATENT NO. 6,436,879

Claims 1, 3, 8-10, 21, 23, and 28-30 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,436,879 ("Brown"). As mentioned above, claims 1, 9-10, 21, 29, and 30 have been amended in this reply. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The Examiner asserts that Brown (see claims 1 and 2) teaches a drilling fluid having cesium formate at a weight-to-volume ratio such that the drilling fluid obtains a

specific gravity of  $2.5 \text{ g/cm}^3$ . However, when this value is converted into a weight-to-volume ratio, one can see that Brown discloses a drilling fluid having a salt concentration of only 242.3%. Accordingly, Brown fails to disclose the invention as claimed.

In view of the above, Brown fails to show or suggest the present invention as recited in independent claims 1, 11, 21, and 31. Thus, these claims as amended are patentable over Brown. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

U.S. PATENT NO. 5,804,535

Claims 1, 2, 5, 8-12, 15, 18-22, 25, 28-32, 35, and 38-40 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,804,535 ("Dobson"). As mentioned above, claims 1, 9-11, 19-21, 29-31, 39, and 40 have been amended in this reply. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The Examiner asserts that Dobson teaches a well drilling and servicing fluid that includes salts, e.g., cesium formate and potassium formate, at concentrations of up to 2160 kilograms-per-cubic meter ( $\text{Kg/m}^3$ ) (see col. 10, lines 14-19). However, when this value is converted into a weight-to-volume ratio, one can see that Dobson discloses a well drilling and servicing fluid having a salt concentration of only 199.1%. Accordingly, Dobson fails to disclose the invention as claimed.

In view of the above, Dobson fails to show or suggest the present invention as recited in independent claims 1, 11, 21, and 31. Thus, these claims as amended are patentable over Dobson. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

U.S. PATENT NO. 6,017,856

Claims 1, 2, 5, 8-10, 21, 22, 25, and 28-30 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,017,856 (“Van Ooyen”). As mentioned above, claims 1, 9-10, 21, 29, and 30 have been amended in this reply. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The Examiner asserts that Van Ooyen teaches a well servicing fluid having potassium formate, and optionally cesium formate, within the claimed range of weight-to-volume ratio. However, as is clear from col. 2, lines 5-17, a maximum salt density that can be obtained by Van Ooyen’s well servicing fluid is  $2.63 \text{ g/cm}^3$ . Accordingly, when this value is converted into a weight-to-volume ratio, one can see that Van Ooyen discloses a well servicing fluid having a salt concentration of only 259.6%. Accordingly, Van Ooyen fails to disclose the invention as claimed.

In view of the above, Van Ooyen fails to show or suggest the present invention as recited in independent claims 1 and 21. Thus, these claims as amended are patentable over Van Ooyen. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Moreover, to the extent that the Examiner seeks to re-characterize any of the above rejections as rendering the instant claims obvious, the Applicant notes that none of the references, whether considered alone or in combination, shows or suggests the claimed combination of chemicals and weight-to-volume ratios. The Applicant notes that the high weight-to-volume fluids disclosed herein are the result of careful studies by the inventors. Typically, high density / high weight-to-volume fluids such as those presently claimed are extraordinarily difficult to make and use due to a “salting out” effect,

whereby as the concentration of salt is increased, a larger percentage of that salt comes out of solution, leaving the resulting weight-to-volume substantially unchanged. A further consequence of this “salting out” effect is that usually, other components previously dissolved in the fluids become salted out – precipitated at the same time that the salt comes out of solution – rendering the polymers less effective or ineffective. Surprisingly, the present inventors have discovered that through the combination of substances and techniques that they have employed, the salting-out effect can be prevented; and instead of precipitating the polymers out of solution and rendering them useless, the polymers become stabilized against thermal decomposition. This counter-intuitive surprise observation seeded the inventive act of the present invention.

Further, the Applicant respectfully reminds the Examiner of the unpredictable nature of the chemical arts and notes that the present invention is not merely the result of “optimization,” but rather is the result of detailed scientific investigation. For example, Van Ooyen discloses using a combination of potassium formate and citrate to give fluids having density around 1.6 in the described examples. Even given the broadest reading to Van Ooyen, one having ordinary skill in the art would not believe the present claims to be shown or suggested by that disclosure.

Moreover, none of the cited references is believed to show the use of cesium and/or halides as required by certain dependent claims, and the use of such in the claimed ranges is certainly not shown nor suggested by the references.

**Rejection(s) under 35 U.S.C § 103**

U.S. PATENT NO. 4,900,457

Claims 1-8, 11-18, 21-28, and 31-38 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,900,457 ("Clarke-Sturman"). As mentioned above, claims 1, 11, 21, and 31 have been amended in this reply. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The Examiner asserts that, although Clarke-Sturman only discloses that a salt content of a well-drilling fluid may be as high as 120%, it would have been obvious to utilize salt concentrations in insignificantly higher levels, such as 120.1%, because the claimed fluids would be expected to have similar properties to those taught in Clarke-Sturman, and expected to be useful as drilling fluids. However, despite the fact that Clarke-Sturman teaches that a composition may include at least one salt of at least one mono- or divalent cation, such as cesium or potassium, Applicant respectfully notes that Clarke-Sturman fails to teach a specific example (see Examples 1-16) where a salt mixture of potassium and cesium or a salt of cesium alone is used in a thermally stable well fluid.

Further, Applicant respectfully notes that Clarke-Sturman fails to teach *any* examples capable of achieving the minimum claimed ratio of 260%, a value which, incidentally, is more than twice the maximum weight-to-volume ratio disclosed in Clarke-Sturman. Thus, those skilled in the art will appreciate that the claimed weight-to-volume ratio is significantly higher than the ratio disclosed in Clarke-Sturman, thereby allowing the claimed invention to achieve a significantly greater fluid salt retention and, hence, a significantly increased thermal stability over Clarke-Sturman.

In view of the above, Clarke-Sturman fails to show or suggest the present

invention as recited in independent claims 1, 11, 21, and 31. Thus, these claims as amended are patentable over Clarke-Sturman. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

### **Conclusion**

Applicant believes this reply to be fully responsive to all outstanding issues and place this application in condition for allowance. If this belief is incorrect, or other issues arise, do not hesitate to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 05542.017002).

Respectfully submitted,

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